CLAIMS:

What is claimed is:

1. An apparatus comprising:

a first reaction chamber;

a gas source coupled to the first reaction chamber to supply a gas to the first reaction chamber comprising constituents adapted to react with a substrate in a process step;

an excitation energy source coupled to the first reaction chamber to generate a plasma comprising ions and radicals from the gas; and

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a second reaction chamber adapted to house a substrate at a site in the second reaction chamber,

wherein the first reaction chamber is coupled to the second reaction chamber and separated from the substrate site by a distance equivalent to the lifetime of the ions at a plasma generation rate.

2. The apparatus of claim 1, wherein the excitation energy source supplies energy having a microwave frequency to generate a plasma from a gas.

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3. The apparatus of claim 1, wherein the second reaction chamber is electrically non-biased.

4. The apparatus of claim 1, wherein the first reaction chamber is adapted to generate a nitrogen plasma, and the dimensions of the first reaction chamber are configured such that substantially all of the ions generated by the plasma are

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changed from an ionic state to a charge neutral state within the first reaction chamber.

5. The apparatus of claim 1, wherein the second reaction chamber is a rapid thermal processing chamber.

6. An apparatus for exposing a substrate to plasma, comprising:

a first reaction chamber;

means for supplying a gas to the first reaction chamber, the gas comprising constituents adapted to react with a substrate in a process step;

means for supplying a plasma comprising ions and radicals to the first reaction chamber;

a second reaction chamber having means for housing a substrate; and

means for providing the plasma to the second reaction chamber substantially free of ions.

7. The apparatus of claim 6, wherein the means for supplying a plasma comprises means for converting the gas to a plasma in the first reaction chamber.

8. A method of forming a plasma of radicals in a chamber, comprising:

generating a plasma comprising ions and radicals in a first chamber;

placing a substrate in a second chamber; and

transferring the plasma into ~~the~~ A second chamber to react with the substrate substantially free of ions.

9. The method of claim 8, wherein the substrate has a surface containing an oxide and the plasma is a nitrogen plasma, the method comprising:

reacting the radicals with the oxide.

10. The method of claim 8, wherein prior to the step of transferring the radicals, the method further comprises the step of changing substantially all of the ions from an ionic stage to a neutral state.

11. A method of nitridizing an oxide, comprising:

generating a plasma comprising ions and radicals in a first chamber;

placing a substrate having an oxide layer on a surface in a second chamber;

transferring the radicals of the plasma into the second chamber substantially free of ions;

reacting a portion of the oxide layer and a portion of the plasma; and

nitridizing a portion of the oxide layer of the substrate.

12. The method of claim 11, wherein the step of reacting the oxide and the plasma includes reacting the radicals with the oxide to form one of a silicon nitride molecule and a silicon oxynitride molecule.

13. The method of claim 11, wherein the step of nitridizing a portion of the oxide layer includes nitridizing an exposed surface of the oxide layer.

14. A method of forming a nitrogen containing material in the presence of an oxide, comprising:

generating a plasma comprising ions and radicals in a first chamber;

placing a silicon wafer having an oxide in a second chamber;

removing substantially all of the ions from the plasma;

transferring the radicals of the plasma into the second chamber;

reacting a portion of the oxide and a portion of the plasma; and

forming a nitrogen containing material in a portion of the oxide layer of the substrate.

15. The method of claim 14, wherein the step of forming a nitrogen containing material includes forming one of a silicon nitride and a silicon oxynitride.

16. The method of claim 14, wherein the nitrogen containing material is formed in an exposed surface of the oxide layer.

17. A system for reacting a plasma with a substrate, comprising:

a first chamber;

a gas source coupled to the first chamber comprising constituents adapted to react with a substrate;

an energy source coupled to the first chamber;

a second chamber configured to house a substrate for processing;

a system controller configured to control the introduction of a gas from the gas source into the first

chamber and to control the introduction of an energy from the energy source; and

a memory coupled to the controller comprising a computer-readable medium having a computer-readable program embodied therein for directing operation of the system, the computer-readable program comprising:

instructions for controlling the gas source and the energy source to convert a portion of a gas supplied by the gas source into a plasma comprising plasma ions and radicals and to deliver the plasma to the second chamber substantially free of ions to react with a substrate in the second chamber.

18. The system of claim 17, wherein the dimensions of the first chamber are configured such that substantially all of the ions generated in the plasma are changed from an ionic state to a charge neutral state in the first chamber.

19. The system of claim 18, wherein the gas is nitrogen.

20. A machine readable storage medium containing executable program instructions which when executed cause a digital processing system to perform a method of reacting a plasma with a substrate, comprising:

generating a plasma comprising radicals and ions in a first chamber; and

transferring the plasma radicals into a second chamber substantially free of ions.